Exhibit A

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,	)	
	)	
PLAINTIFF/	)	
COUNTERCLAIM- DEFENDANT,	)	
	)	
	)	
v.	)	CA NO. 05-00747-SLR
	)	
ANDREW CORPORATION,	)	
	)	
DEFENDANT/	)	
COUNTERCLAIM-PLAINTIFF.	)	

EXPERT REPORT OF DR. DAVID GOODMAN
ON THE INVALIDITY OF U.S. PATENT NO. 5,327,144

I. INTRODUCTION

Andrew Corporation has retained me as a technical expert in this case. I expect to testify at trial regarding the matters set forth in this report if asked by the Court or the parties' attorneys. I will also be prepared to provide the Court and the jury with a tutorial on the technology involved in this matter, including the evolution of the technology. I am being compensated for my work associated with the litigation at my customary rate of $600 per hour. My compensation does not depend on the outcome of this litigation, the opinions I express, or my testimony.

I understand that TruePosition, Inc. has asserted certain claims of United States Patent 5,327,144 against Andrew Geometrix products. I submit this expert report, which contains my opinion regarding the invalidity of the claims of the '144 patent asserted by TruePosition. I have been asked to determine whether claims 1, 2, 22, 31, and 32, of the '144 patent are valid. For the reasons stated below, it is my opinion that the asserted claims are invalid because they are anticipated by Japanese Patent Application Kokai (Laid-Open) Publication No.: H3-239091, October 24, 1991 ("the Kono application").

II. BACKGROUND AND QUALIFICATIONS

A. QUALIFICATIONS

I am currently a Program Director at the National Science Foundation in Arlington, Virginia on temporary assignment from my position as a professor of Electrical and Computer Engineering at Polytechnic University in Brooklyn, New York. Before joining the NSF, I was Director of the Wireless Internet Center for Advanced Technology (WICAT), located at Polytechnic University, Columbia University, and the University of Virginia. WICAT is a National Science Foundation Industry/University Cooperative Research Center. From August 1999 until August 2001, I was Head of the Department of Electrical and Computer Engineering at Polytechnic University.

Before joining Polytechnic University in 1999, I was a Professor of Electrical and Computer Engineering at Rutgers, the State University of New Jersey. From 1988 until 1991, I was Chairman of the Department of Electrical and Computer Engineering at Rutgers. In 1989, I founded the Wireless Information Network Laboratory (WINLAB) at Rutgers University.

WINLAB was the first center of excellence at a United States university focused on cellular telecommunications. In 1991, WINLAB was designated the National Science Foundation Industry/University Cooperative Research Center for Wireless Information Networks. I was the Director of WINLAB until 1999, when I joined Polytechnic University.

From 1967 to 1988, I was at Bell Laboratories, where I held the position of Department Head in Communications Systems Research. In 1995, I was a Research Associate at the Program on Information Resources Policy at Harvard University. In 1997, I was Chairman of the National Research Council Committee studying "The Evolution of Untethered Communications."

I have extensive experience performing and managing research in telecommunications and digital signal processing. My research in cellular telecommunications has produced innovations covering multiple access protocols, network architecture, mobility management, and radio resources management. In 1986 and 1987, while I was employed by AT&T Bell Laboratories, I had a research assignment in the United Kingdom. As part of this assignment, I had detailed technical discussions with experts in several European countries who were participating in the establishment of the GSM cellular standard. At that time, I acquired a thorough understanding of GSM technology, and I have maintained this expertise ever since through technical discussions, participation in various forums, and in the conduct of my teaching, research, and writing.

I was one of the first professors to teach a college-level course in cellular telecommunications and have taught such courses since January 1989. In the early 1990's, I also presented a three-day short course at many large companies including Bell Atlantic Mobile, Pacific Bell, US West, Ericsson and AT&T. This course introduced corporate students to the operations of several cellular systems including AMPS, TDMA, and GSM. I have lectured and published widely on the subject of cellular telecommunications. My publications include approximately 100 papers. I have also consulted for many corporations in this field, including: Ericsson, Motorola, Lucent Technologies, and Nortel Networks.

I received a Bachelor's degree at Rensselaer Polytechnic Institute in 1960, a Master's degree at New York University in 1962, and a Ph.D. at Imperial College, University of London in 1967, all in electrical engineering.

I am a Member of the National Academy of Engineering, a Foreign Member of The Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronics Engineers, and a Fellow of the Institution of Electrical Engineers.

In 1997, I received the ACM/SIGMOBILE Award for "Outstanding Contributions to Research on Mobility of Systems Users, Data, and Computing." In 1999, I won the RCR Gold Award for the best presentation at the Conference on Third Generation Wireless Communications. In 2003, I received an IEEE Avant Garde Award for Contributions to Speech Coding and Internet-Packet Cellular Networks. Three of my papers on wireless communications have been cited as Paper of the Year by IEEE journals.

I am a frequent public speaker in a variety of forums on wireless communications. I am author of the books *Wireless Personal Communications Systems*, published in 1997 by Addison Wesley and co-author, with Roy Yates, of *Probability and Stochastic Processes A Friendly Introduction for Electrical and Computer Engineers, Second Edition*, published in 2004 by Wiley. I am co-editor of six other books on wireless communications. I am a named inventor on eight United States patents and have one patent application pending.

B. List of Authored Publications

Attached as Exhibit A to my report is my Curriculum Vitae, which contains a list of publications that I have authored since 1988.

C. Prior Testimony

In the past four years I have provided expert testimony in depositions in the following cases: Aerotel, Ltd. v. Verizon Communications Inc. et al. (S.D.N.Y); PowerOasis, Inc. and PowerOasis Networks, LLC, v. T-Mobile USA, Inc., (D. NH); Papyrus Technology Corp. v. New York Stock Exchange, Inc., (S.D.NY); Agere v. Broadcom, (E.D. PA); and Freedom Wireless, Inc. v. Boston Communications Group, Inc. et al. (D. MA). In addition I testified at a Markman hearing and in a tutorial for the Court in Agere v. Broadcom, (E.D. PA).

D. INFORMATION RELIED ON

Attached as Exhibit B is a list of the materials that I reviewed in connection with my preparation of this report.

III. OPINIONS AND BASES FOR THOSE OPINIONS

A. LEGAL STANDARDS

In conducting my analysis and forming my opinions I have received and relied upon information provided by counsel regarding the applicable legal standards on patent invalidity.

I understand that issued U.S. Patents are presumed valid and that the standard to prove invalidity is clear and convincing evidence.

I understand that for an independent patent claim to be anticipated by the prior art, the prior art reference must disclose each and every limitation of the claim either expressly or inherently. I also understand for a dependent claim to be anticipated by the prior art, the prior art reference must disclose each and every limitation of both the dependent claim and any claim(s) from which it depends.

I understand that for a patent claim to be invalid for obviousness the differences between the claimed invention as a whole and the prior art would have been obvious to a person of ordinary skill in the art at the time of the invention. I understand that before an obviousness determination can be made, I must consider the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the claimed invention and the prior art.

I understand that claims are construed according to their plain and ordinary meaning to one of ordinary skill in the art. I understand that the same claim construction must be used for both an infringement analysis and an invalidity analysis; I understand that claims cannot be construed one way for an infringement analysis and a different way for an invalidity analysis.

I also understand that the Court has not yet construed claim terms in this case, but that the parties have exchanged various preliminary claim interpretations. Regardless of which

constructions are adopted it is my opinion that the Kono application will anticipate the '144 patent if its claims are read broadly enough to cover Andrew's Geometrix products.

B. ORDINARY SKILL IN THE ART

A person of ordinary skill in the art of the '144 patent would have had a masters degree in electrical and computer engineering or computer science, or the equivalent skills and knowledge, and/or at least two years' experience at a cellular operating company, or a company that designs/produces cellular systems or services, including value added systems or services such as location determination.

C. THE '144 PATENT

The '144 patent is titled "Cellular Telephone Location System". Using the system disclosed in the patent, an AMPS cellular telephone network estimates the geographical coordinates of cellular telephones served by the network.

The technique at the heart of the purported invention is referred to as Time Difference of Arrival (TDOA) location determination. TDOA location determination was a well known technique at the time of the invention.

To use this technique in a cellular network, the patent dictates that at least three cell sites must receive the same radio signal from a cellular telephone. Each one converts the radio signal to a baseband signal, digitizes the base band signal and sends the digitized baseband signal, along with a time stamp to a central site. As shown in Figure 7 of the '144 patent, the central site uses correlation techniques to estimate the differences among times of arrival ("TDOA data") at all pairs of reporting cell sites. It uses the TDOA data to estimate the geographical coordinates of the cellphone by comparing the measured delays with a grid of reference delays stored at the central site. Each reference delay is associated with a unique geographical reference location. The central site uses a least squares metric to determine the best reference location. After determining the best reference location, the central site again uses a least squares technique to further refine the location estimate.

All of the claims of the '144 patent pertain to cellular telephone systems. Figures 1A and 1C of the '144 patent display some of the properties of a generic cellular system. Figure 1C

shows "the main components and arrangement of cellular telephone system." '144 Pat., Col. 1, ll. 51-52.

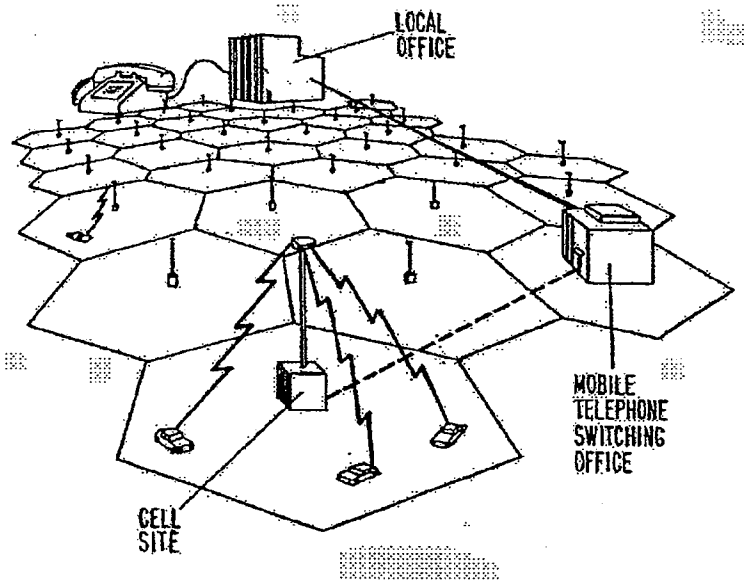

Fig. 1C, '144 Patent

Figure 2 of the '144 patent shows "a schematic diagram of a cellular telephone location system in accordance with the present invention." '144 Patent, Col. 7, ll. 60-62.

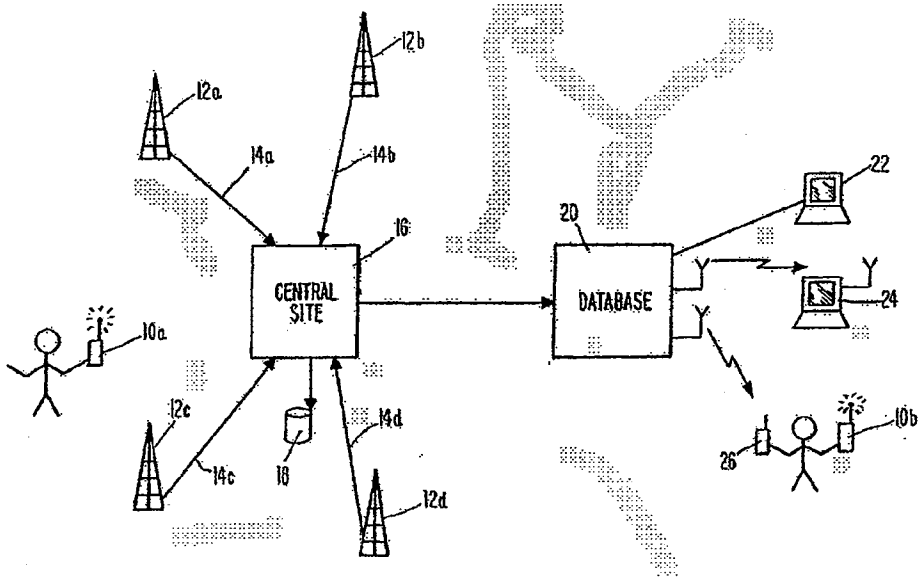

Fig. 2, '144 Patent

D. CLAIM TERMS

A person of ordinary skill in the art would recognize that the terms of art in the '144 patent were used to describe analog cellular systems in common use when the patent was filed in 1993.

(1) Analog Systems and Reverse Control Channels

In all of the patent claims, the first important limitation is "cellular telephones each initiating periodic signal transmissions over one of a prescribed set of reverse control channels". A person of ordinary skill in the art in 1993 would recognize reverse control channels as components of the analog cellular and dual-mode telephone systems specified in the United States national standard, ANSI 553, in Interim Standard 54, and Interim Standard 95 published by the Telecommunications Industry Association.

My interpretation is further supported by the following passage of the '144 patent, and the testimony of two named inventors regarding that passage. The '144 patent states:

> In addition, it should be noted that the inventive concepts disclosed herein are applicable to both analog and digital (for example, TDMA) cellular systems that employ analog control channels.

'144 patent, col. 1, lns. 27-31. A person of skill in the art would recognize "digital ... systems that employ analog control channels" to refer to cellular systems that carry voice information in a digital format and use the signal formats of the AMPS system for transmitting system control information.

Named inventor Dr. Curtis Knight testified:

Q: What are analog control channels?

A: I'm not sure I know what was meant by that but what we had in mind was AMPS when we were writing this.

Knight October 6, 2006 Page 89 at 25 through Page 90 at 13. Named inventor Dr. John Webber concurred. Webber October 4, 2006 Page 23 at 9-18.

There are two types of transmissions disclosed in the '144 patent; one type is a signal transmitted over a "reverse control channel." The analog cellular standards that use the term "reverse control channel" specify that cellular telephones transmit information in a prescribed format that is different than the format specified by GSM. The format specified by analog cellular standards is illustrated in the following diagram that I prepared many years ago to explain the AMPS system to students:

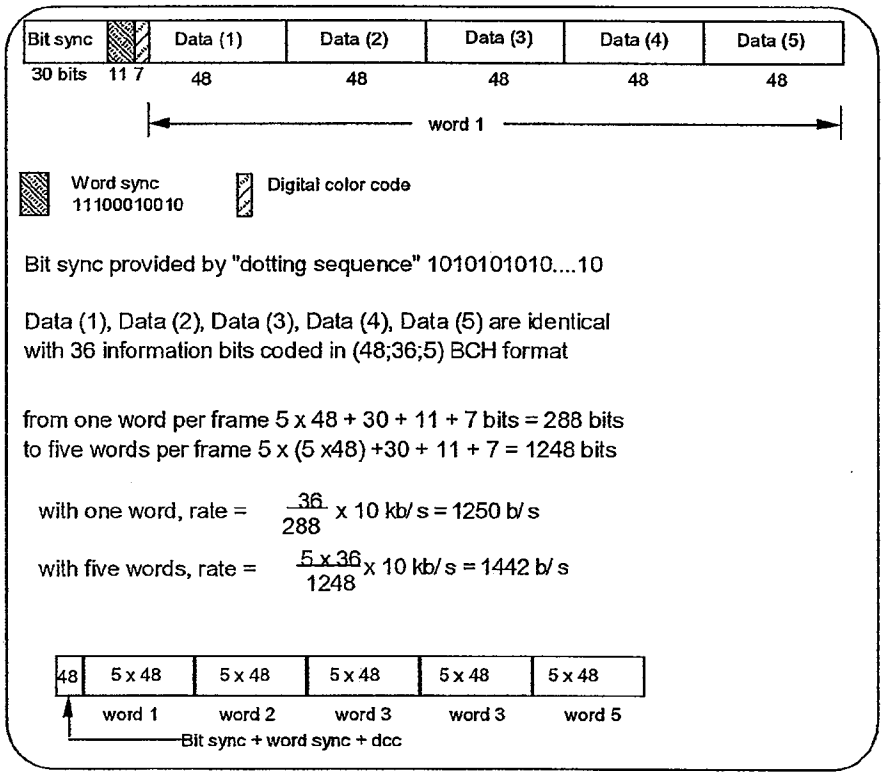

Fig. 3.10, Wireless Personal Communications Systems

"Reverse control channels" also have a many-to-one property in that they convey information from many cellular phones to one base station.

In order to assert the '144 patent against cellular systems that use Andrew technology, True Position has to adopt an interpretation of "transmissions over ... reverse control channels" that is significantly more inclusive than the transmissions addressed by the '144 patent. This

inclusion would embrace a wider range of signal formats carried on channels that convey information from many cellular telephones to one base station.

(2) The Independent Claims

The independent claims (1, 22, and 31) asserted by True Position address details of: (a) the signal transmitted by a cellphone; (b) signal reception at the cellular cell sites; (c) the way in which the arrival time is determined at each cell site; (d) the nature of the reports transmitted by the cell sites to the location determination device; and (e) how the location determination device uses the reports to calculate the geographical coordinates of the cellphone.

a. Signals transmitted by a cellphone

The independent claims state that the signals used for location determination are transmitted periodically "over one of a prescribed set of reverse control channels".

b. Signal reception at the cell sites

Claim 1 requires that the signal reception be accomplished by an antenna and a baseband converter coupled to the antenna. In Claim 22, the cell sites are equipped to receive the signals from the cellphone and Claim 31 states that the location determination method receives the signals.

c. Determining arrival time at cell sites

Claim 1 requires a timing signal receiver for receiving a timing signal common to all cell sites.

d. Reports transmitted by the cell sites

Claim 1 requires that the baseband signal be sampled at a prescribed frequency and that the signal samples and a time stamp be formatted in digital data frames with a prescribed number of data bits. Claim 31 requires the cell site to produce frames of data with a prescribed number of data bits and time stamp bits.

e. Using the reports to calculate cellphone location

Claim 1 requires that the reports arrive at a central site system from the cell sites. The central site system processes the frames of data in the report to produce a table identifying individual signals and associated time differences of arrival at the cell sites. It then determines cellphone locations from the time differences of arrival. Claim 22 requires the system to have a database, accessible from remote locations, containing cellphone identities and locations. Claim 31 states that the system processes the frames of data from the cell sites to identify cellular telephones and differences in times of arrival and that it uses this information to determine cellphone location.

E. THE KONO APPLICATION

The title of the Kono application is translated to English as "Moving Body Radio Communication Apparatus". Like the '144 patent, it describes determination of the location of a cellular telephone from information about the arrival times at a plurality of base stations of a position locating signal transmitted by the telephone.

The Kono application states that the signal is transmitted on a shared channel and received at multiple base stations. Each base station determines the time of arrival of the position locating signal and transmits associated data to a switching station that in turn transmits the data to a position location calculating device. This device uses data from the base stations such as time differences of arrival at the multiple base stations to calculate the position of the cellphone.

F. RELATION OF THE '144 PATENT TO THE KONO APPLICATION

All of the claims of the '144 patent pertain to cellular telephone systems. As discussed above, Figure 2 of the '144 patent shows a "a schematic diagram of a cellular telephone location system in accordance with the present invention"; similarly, the Kono application places the invention in the context of a generic cellular system illustrated in Figures 1 and 4:

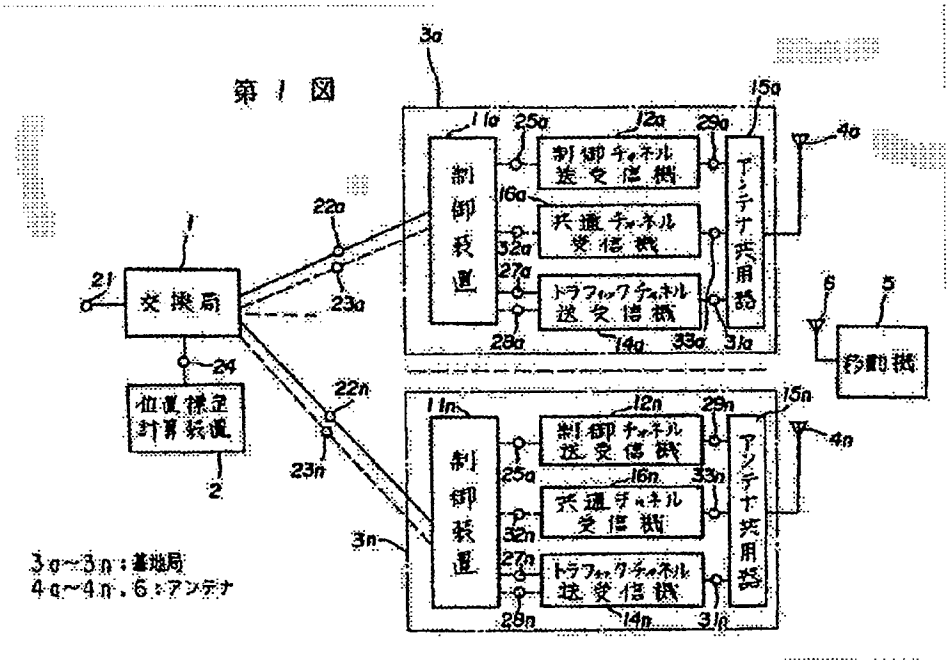

Fig. 1, Kono Application

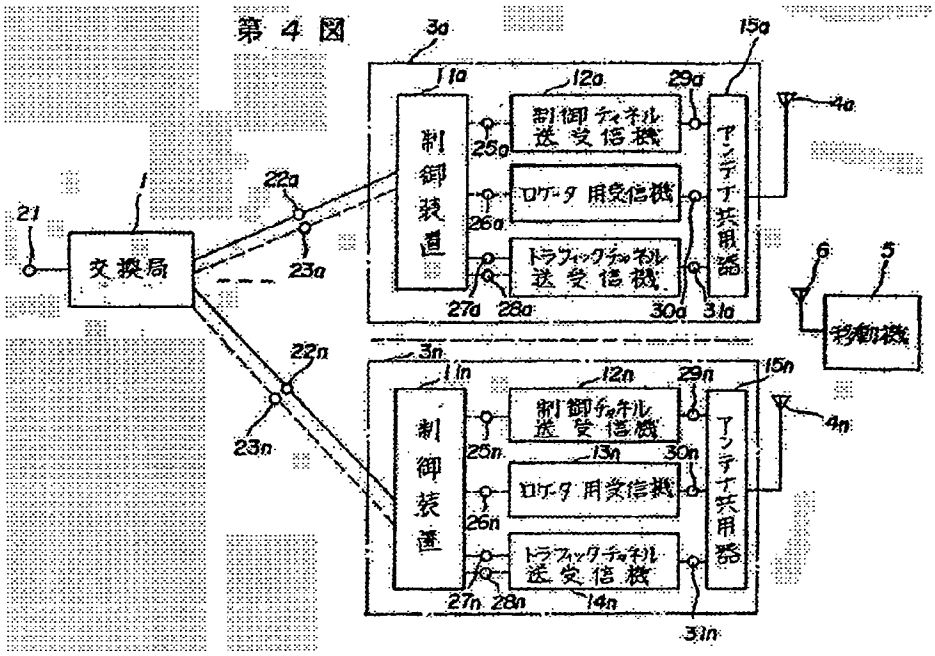

Fig. 4, Kono Application

Within this system, all of the claims of the '144 patent require periodic transmissions by the cellular telephones over reverse control channels. The Kono application describes "position locating signals from a moving body using shared channels" (page 3, 4th paragraph). It is clear that "moving body" in the Kono application is synonymous with the cellular telephone in the '144 patent.

All of the '144 patent claims require three or more cell site systems that receive the periodic transmissions from the cellular telephones. Similarly the Kono patent refers to *n* base stations (labeled *3a* to *3n* in Figures 1, 3, and 4, each containing a shared channel receiver (*16a – 16n*).

Claim 1 of the '144 patent requires "an elevated ground-based antenna" at each cell site. Figures 1, 3, and 4 of the Kono application also display antennas (labeled *4a – 4n*) at the *n* base stations.

Claim 1 of the '144 patent also includes a "baseband converter" for receiving the periodic transmissions on the reverse control channels. The corresponding device in the Kono application is a shared channel receiver at each base station (***16a – 16n***).

The cell site system in Claim 1 of the '144 patent also includes a "timing signal receiver for receiving a timing signal common to all base stations". The corresponding device in the Kono application is an ultra-high precision clock (labeled *54* in Figure 2) within each of the shared channel receivers. The ultra-high precision clocks at all of the base stations are "corrected by the switching station *1*". Page 5, ¶ 3, l. 16.

The other element of the cell site system in Claim 1 of the '144 patent is a "sampling subsystem" that samples the baseband signal and formats the samples and time stamps in frames of digital data. Each time stamp represents the time of arrival of one locating signal from a cellphone. In the Kono application, the base stations *3a – 3n* receive the position locating signal. A time measurement circuit (***53***) in each base station measures the absolute time of arrival and reports it to the switching station. A person of ordinary skill in the art would recognize that the report would be contained in data frames.

Part (b) of Claim 1 of the '144 patent specifies a "central site system operatively coupled to said cell site systems". The corresponding element of the Kono application is the switching station (*1*) in communication with the base stations (*3a – 3n*) through junction points (*23a – 23n*) that convey data or control signals between the switching system and the base stations.

The central site system in Claim 1 of the '144 patent processes the frames of data arriving from the cell site systems and generates a table containing information that identifies the signals arriving from the cell sites and time differences of arrival at the different cell sites. The central site system contains a "means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones." In the Kono application the switching station "receives data in the form of these position locating signals" forwards the data received from the base stations to the position locating device (*2*). The position locating device uses the data to calculate the position of the cellular telephone.

Claim 2 of the '144 patent depends on Claim 1 and states that the timing signal receiver is a Global Position System receiver. In the Kono patent the timing signal common to all base stations exists at the switching station (*1*): "...the time of the standard clock *54* is corrected by the switching station *1*." Page 5, ¶ 3, l. 16. Since at least as early as 1993, some cellular networks have had GPS receivers at every base station. The GPS receivers receive a timing signal common to all base stations. The location systems disclosed in the Kono reference work in conjunction with cellular networks. When those cellular networks have GPS receivers, they can be used with the location system disclosed.

Claim 22 of the '144 patent is less specific than Claim 1. In addition to base stations and reverse control channels Claim 22 requires simply a means of determining the locations of the cellular telephones "by receiving and processing signals emitted during said periodic reverse control channel transmissions". The elements of the Kono application that perform this function are the shared channel receivers in the base stations, the ultra-high precision clocks, the time measurement circuit, the switching station and the position locating device.

The remainder of Claim 22 specifies a "database means for storing location data identifying the cellular telephones and their respective locations, and for providing access to said database to subscribers at remote locations". Since their inception in the early 1990s, GSM

networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

Claim 31 describes the same operations as Claim 1 without referring to the antenna, the baseband converter, the timing signal receiver, and the sampling subsystem at each cell site. It requires frames of data that are processed to identify individual telephones and time differences of arrival and using the time differences to determine the locations of the cellular telephones. The corresponding operations in the Kono application are described above in the comparison of Claim 1 of the '144 patent with the Kono application.

Claim 32 depends on Claim 31. It is identical to the final Claim element of Claim 22.

(1) Summary Chart Reflecting Opinions

Claim Language	Present In Kono?	Kono Disclosure
1. A cellular telephone location system for determining the locations of multiple mobile cellular telephones	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
each initiating periodic signal transmission over one of a prescribed set of reverse control channels, comprising:	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
(a) at least three cell site systems, each cell site system comprising:	Yes	Base stations 3a-3n.
an elevated ground-based antenna;	Yes	Antennas 4a-4n.
a baseband convertor operatively coupled to said antenna for receiving cellular telephone signals transmitted over a reverse control channel by said cellular telephones and	Yes	Control channel transceivers 12a-12n.

Claim Language	Present In Kono?	Kono Disclosure
providing baseband signals derived from the cellular telephone signals;		
a timing signal receiver for receiving a timing signal common to all cell sites;	Yes	"...the time of the standard clock ***54*** is corrected by the switching station ***1***." Page 5, ¶ 3, l. 16.
and a sampling subsystem operatively coupled to said timing signal receiver and said baseband convertor for sampling said baseband signal at a prescribed sampling frequency and formatting the sample signal into frames of digital data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said cellular telephone signals were received; and	Yes	Kono teaches software and processors in control circuit ***55*** that determine and format time of arrival information. Time stamp bits: "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***. " Page 5, ¶ 3. ll. 13-15. Data bits: "It should be noted that the junction points ***22a – 22n*** are used for voice communication signals, and the junction points ***23a – 23n*** are used for data or control signals." Page 5, ¶ 1, ll.15-17.
(b) a central site system operatively coupled to said cell site systems, comprising:	Yes	Switching station ***1*** and position location calculating device ***2***.
means for processing said frames of data from said cell site systems	Yes	"The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll.23-25.
to generate a table identifying individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell site systems;	Yes	"reports to the switching station ***1*** via the control devices ***11a – 11n*** data such as the difference in arrival time of position locating signals with respect to the various base stations ***3a – 3n***." Page 4, ¶ 2, ll. 21-23.
and means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.	Yes	"The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll. 23-25.

Claim Language	Present In Kono?	Kono Disclosure
2. A cellular telephone location system as recited in claim 1,	Yes	See the above claim chart for claim 1.
wherein said timing signal receiver comprises a global positioning system (GPS) receiver.	Yes	Since at least as early as 1993, some cellular networks have had GPS receivers at every base station. The location systems disclosed in the Kono reference and the '144 patent work in conjunction with cellular networks. When those cellular networks have GPS receivers, they can be used by the location system.

Claim Language	Present In Kono?	Kono Disclosure
22. A ground-based cellular telephone system serving a plurality of subscribers possessing mobile cellular telephones, comprising:	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
(a) at least three cell sites;	Yes	Base stations 3a-3n.
equipped to receive signals sent by multiple mobile cellular telephones	Yes	Control channel transceivers ***12a-12n***.
each initiating periodic signal transmissions	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
over one of a prescribed set of reverse control channels	Yes	"***12a – 12n*** are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations ***3a – 3n.***" Page 2, ¶ 2, ll. 5-6.
(b) locating means for automatically determining the locations of said cellular telephones by receiving and processing signals emitted during said periodic reverse control channel transmissions; and	Yes	Kono teaches software and processors in control unit ***55*** that determine and format time of arrival information. "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***." Page 5, ¶ 3. ll. 13-15. "The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll. 23-25.

(c) database means for storing location data identifying the cellular telephones and their respective locations, and for providing access to said database to subscribers at remote locations.	Yes	Since their inception in the early 1990s, GSM networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

Claim Language	Present In Kono?	Kono Disclosure
31. A method for determining the location(s) of one or more cellular telephones	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
each initiating periodic signal transmissions over one of a prescribed set of reverse control channels, comprising the steps of:	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
(a) receiving said reverse control channel signals at least three geographically separated cell sites;	Yes	***"12a – 12n*** are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations ***3a – 3n."*** Page 2, ¶ 2, ll. 5-6.
(b) processing said signals at each cell site to produce frames of data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said frames were produced at each cell site;	Yes	Kono teaches software and processors in hardware unit 55 that determine and format time of arrival information. Time stamp bits: "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***. " Page 5, ¶ 3. ll. 13-15. Data bits: "It should be noted that the junction points ***22a – 22n*** are used for voice communication signals, and the junction points ***23a – 23n*** are used for data or control signals." Page 5, ¶ 1, ll.15-17.

(c) processing said frames of data to identify individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell sites; and	Yes	"reports to the switching station *1* via the control devices *11a – 11n* data such as the difference in arrival time of position locating signals with respect to the various base stations *3a – 3n*." Page 4, ¶ 2, ll. 21-23.
determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.	Yes	"The base station *1* forwards these data to the position location calculating device *2*, and the position of the mobile equipment *5* is calculated." Page 4, ¶ 2, ll. 23-25.

Claim Language	Present In Kono?	Kono Disclosure
32. A method as recited in claim 31,	Yes	See the above claim chart for claim 31.
further comprising the steps of storing, in a database, location data identifying the cellular telephones and their respective locations, and providing access to said database to subscribers at remote locations.	Yes	Since their inception in the early 1990s, GSM networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

IV. RESERVATION OF RIGHTS

This report presents my opinions to date regarding the matters set forth above. As additional data, information, or testimony becomes available to me or is provided to me, I intend to consider this information. I thus reserve the right to modify or supplement this report or the opinions contained herein if I find it appropriate to do so in light of any additional information. I may also be called upon to, and intend to if asked, provide expert testimony in rebuttal to any proofs put forth by TruePosition or any opinions expressed in expert reports on behalf of TruePosition.

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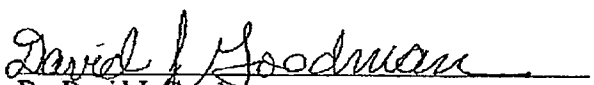
Dated: December 1, 2006



Dr. David J. Goodman

EXHIBIT A

CURRICULUM VITAE OF DR. DAVID GOODMAN

I. BIOGRAPHY

Since 1999, David Goodman has been a Professor of Electrical and Computer Engineering at Polytechnic University in Brooklyn, New York. He currently holds a temporary position as Program Director in the Computer and Network Systems Division of the National Science Foundation. Before joining the NSF in February 2006, he was Director of the Wireless Internet Center for Advanced Technology, a National Science Foundation Industry/University Cooperative Research Center at Polytechnic University, Columbia University, and University of Virginia. Until August 2001, he was Head of the Electrical and Computer Engineering Department at Poly.

Prior to joining Poly, Dr. Goodman was a professor at Rutgers University, where he founded the Wireless Information Network Laboratory (WINLAB) in 1989. He was WINLAB Director until he moved to Brooklyn Poly. In 1995, he was a Research Associate at the Program on Information Resources Policy at Harvard University. In 1997, he was Chairman of the National Research Council Committee studying "The Evolution of Untethered Communications." From 1967 to 1988 he was at Bell Laboratories, where he was Department Head in Communications Systems Research. He has made fundamental contributions to digital signal processing, speech coding, and wireless information networks.

Dr. Goodman is a member of the National Academy of Engineering and a foreign member of The Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronic Engineers, and a Fellow of the Institution of Electrical Engineers. In 1997, he received the ACM/SIGMOBILE Award for "Outstanding Contributions to Research on Mobility of Systems Users, Data, and Computing". In 1999 he won the RCR Gold Award for the best presentation at the Conference on Third Generation Wireless Communications. In 2003, he received the Avant Garde award from the Vehicular Technology Society of the IEEE. Three of his papers on wireless communications have been cited as Paper of the Year by IEEE journals.

Dr. Goodman is a frequent public speaker in a variety of forums on wireless communications. He is author of the books "Wireless Personal Communications Systems", published in 1997 by Addison Wesley and co-author, with Roy Yates, of "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", published by Wiley in 1998, with a second edition published in 2004. He is a co-editor of six other books on wireless communications. He received a Bachelor's degree at Rensselaer Polytechnic Institute (1960), a Master's at New York University (1962), and a Ph. D. at Imperial College, University of London (1967), all in Electrical Engineering.

II. EDUCATION

Doctor of Philosophy (Electrical Engineering), 1967
Imperial College, University of London

Master of Electrical Engineering, 1962
New York University

Bachelor of Electrical Engineering, 1960
Rensselaer Polytechnic Institute

III. PROFESSIONAL EXPERIENCE

National Science Foundation, 2006 - Present
Program Director
Computer and Network Systems Division
(On leave from Polytechnic University)

Polytechnic University, 1999 - Present
Professor of Electrical and Computer Engineering
Director, NSF Wireless Internet Center for Advanced Technology
Head Of Department, 1999-2001

Rutgers University, 1988 - 1999
Director, Wireless Information Network Laboratory (WINLAB), 1989 - 1999
Chair, Department of Electrical and Computer Engineering, 1988 - 1991

Harvard University, 1995
Research Associate, Program on Information Resources Policy

AT&T Bell Laboratories 1960 - 1962, 1967-1988
Department Head, Communications Systems Research

Imperial College, London, 1983-1988
Visiting Professor of Electrical Engineering

Southampton University, 1987-1990
Visiting Professor of Electronics and Computer Science

IV. HONORS AND AWARDS

Member, National Academy of Engineering

Foreign Member, Royal Academy of Engineering

Fellow, Institute of Electrical and Electronic Engineers

Fellow, Institution of Electrical Engineers

2003 IEEE Avant Garde Award for Contributions to Speech Coding and Internet-Packet Cellular Networks

1999 RCR Gold Award for Best Talk at Wireless Technology Conference

1997 ACM Award for Outstanding Contributions to Research on Mobility of Systems, Users, Data and Computing

Paper of the Year: IEEE Transactions on Vehicular Technology: 1992

Paper of the Year: IEEE Communications Magazine: 1992

Paper of the Year: IEEE Transactions on Vehicular Technology: 1988

V. PAPERS SINCE 1988

1. **"Government Regulation and Innovation in Information Technology"**
   D. J. Goodman
   Information Technology: The Public Issues, R. Plant, F. Gregory, and A. Brier, ed., Manchester University Press, Chapter 4, pp 62-78 (1988).

2. **"Packet Data Transmission over Mobile Radio Channels"**
   C.K. Siew and D.J. Goodman
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3. **"Packet Reservation Multiple Access for Local Wireless Communications"**
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4. **"Cellular Packet Communications"**
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5. **"Evolution of Wireless Information Networks"**
   European Transactions on Telecommunications Special Issue on Major Issues for Telecommunications in the 1990's, Vol. 2, No. 1, pp 10 5-113 (January 1991)

6. **"Efficiency of Packet Reservation Multiple Access"**
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7. **"Second Generation Wireless Information Networks"**
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8. **"Trends in Cellular and Cordless Communications"**
   IEEE Communications Magazine, Vol.29,No. 7, pp 31-40 (June 1991) 1992 Magazine Prize Paper Award

9. **"Performance of PRMA: A Packet Voice Protocol for Cellular Systems"**
   S. Nanda, D.J. Goodman and U. Timor
   IEEE Transactions on Vehicular Technology, Vol. 40, No. 3,pp 584-598 (August 1991) 1992 Jack Neubauer Award

10. **"A Packet Reservation Multiple Access Protocol for Integrated Speech and Data Transmission"**
    W.C. Wong and D.J. Goodman
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11. **"Network Control for Wireless Communications"**
    D.J. Goodman, G.P. Pollini and K.M. Meier-Hellstern
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12. **"Centralized Power Control in Cellular Radio Systems"**
    S. A. Grandhi, R. Vijayan, D.J. Goodman, J. Zander
    IEEE Transactions on Vehicular Technology, Vol. 42,No. 4, pp. 466-468 (November 1993)

13. **"A Predictive Load-Sharing Scheme in a Microcellular Radio Environment"**
    Kuek, S.S., W.-C. Wong, R. Vijayan, D.J. Goodman
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14. **"Distributed Power Control in Cellular Radio Systems"**
S.A. Grandhi, R. Vijayan, and D.J. Goodman
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24. "The Person in PC and PCS"
D. J. Goodman
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C. U. Saraydar, N. B. Mandayam, and D. J. Goodman
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in System-Level Power Optimization for Wireless Multimedia Communication Power Aware Computing, R. Karri and D.J. Goodman editors, Kluwer, 2002

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X. Lu, E. Erkip, Y. Wang, and D. J. Goodman
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VI. PATENTS

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3. **"Spread spectrum FH-MFSK receiver"**
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4. **"Sidetone control circuit for a telephone set"**
David Goodman, Johnston James, Noll Michael
patent no. 4,081,620, Mar. 1978

5. **"Error detection and correction system"**
David Goodman, Steele Raymond
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6. **"Adaptive quantizer apparatus using training model"**
Gersho Allen, David Goodman
patent no. 3,931,596, Jan 1976

7. **"Adaptive delta modulator"**
David Goodman
patent no. 3,652,957, Mar. 1972

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David Goodman
patent no. 3,596,267, Jul 1971

VII. BOOKS

1. **Wireless Personal Communications Systems**
   D. J. Goodman
   Addison-Wesley Publishing, 417 pgs. (1997).

2. **Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers**
   R. D. Yates and D. J. Goodman
   John Wiley & Sons, Inc., 454 pgs. (1998).

3. **Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, 2nd. edition**
   R. D. Yates and D. J. Goodman
   John Wiley & Sons, Inc., 519 pgs. (2004).

4. **Third Generation Wireless Information Networks**
   S. Nanda and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 317 pgs. (1992).

5. **Wireless Communications - Future Directions**
   J. Holtzman and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 339 pgs. (1993).

6. **Wireless and Mobile Communications**
   J. Holtzman and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 286 pgs. (1994).

7. **Mobile Multimedia Communications**
   D. J. Goodman and D. Raychaudhuri, Ed.
   Plenum Press, 321 pgs. (1997).

8. **The Evolution of Untethered Communications, Committee on Evolution of Untethered Communications**
   D. J. Goodman
   Chair, National Academy Press, 189 pgs. (1997).

9. **System-Level Power Optimization for Wireless Multimedia Communication Power Aware Computing**
   R. Karri and D.J. Goodman, Ed.
   Kluwer Academic Publishers, 248 pgs., (2002).

EXHIBIT B

MATERIALS CONSIDERED BY DR. DAVID GOODMAN

1. U.S. Patent 5,327,144
2. Prosecution History of U.S. Patent 5,327,144
3. Japanese Laid-open Patent Application (JP3239091)
4. English Translation of Japanese Laid-open Patent Application (JP3239091)
5. Andrew's Response to TruePosition's 1st Set of Interrogatories (dated April 7, 2006)
6. Andrew Corporation's Supplemental Responses to TruePosition's First Set of Interrogatories (dated June 23, 2006)
7. Andrew Corporation's Supplemental Responses to TruePosition's Interrogatory Nos. 3 and 7 (dated November 8, 2006)
8. TruePosition's Responses to Defendant's First Interrogatories (dated May 1, 2006)
9. TruePosition's Supplemental Responses to Defendant's First Interrogatories (dated May 22, 2006)
10. TruePosition's Second Supplemental Responses to Defendant's First Interrogatories (dated August 1, 2006)
11. TruePosition's Third Supplemental Responses to Defendant's First Interrogatories (dated August 9, 2006)
12. TruePosition's Seventh Supplemental Responses to Defendant's First Interrogatories (November 6, 2006)
13. Andrew's Preliminary Claim Constructions as of November 22, 2006 (dated November 22, 2006)
14. TruePosition's Identification of Claim Terms and Proposed Constructions (dated November 22, 2006)
15. TruePosition's Proposed Construction of Claim Terms and Phrases That Andrew Believes Required Construction (November 27, 2006)
16. Rob Anderson 30(b)(6) Deposition Transcript (November 14, 2006)
17. Rob Anderson Deposition Transcript (September 21, 2006)
18. Rob Anderson 30(b)(6) Deposition Transcript (October 24, 2006)
19. Curtis Knight Deposition Transcript (October 6, 2006)
20. Joseph Sheehan Deposition Transcript (October 19, 2006)

21. John Webber Deposition Transcript (October 4, 2006)

22. Wikipedia

23. Wireless Personal Communications Systems
D. J. Goodman
Addison-Wesley Publishing, 417 pgs. (1997)

CERTIFICATE OF SERVICE

I, Rachel Pernic Waldron, hereby certify that on this 1st day of December, 2006, I served a true and correct copy of the foregoing **EXPERT REPORT OF DR. DAVID GOODMAN ON THE INVALIDITY OF U.S. PATENT NO. 5,327,144** and its accompanying exhibits upon the following individuals in the manner indicated:

VIA ELECTRONIC MAIL

Paul B. Milcetic, Esq.
David L. Marcus, Esq.
Daniel J. Goettle, Esq.
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1007 N. Orange Street
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Wilmington, DE 19899
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Rachel Pernic Waldron

Rachel Pernic Waldron

Exhibit B

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC. AND KSI, INC., Plaintiffs/ Counterclaim Defendants, v. **ALLEN TELECOM INC.,** Defendant/ Counterclaim Plaintiff	Civil Action No. 01-0823-GMS

Expert Report On Validity
of the '555, '013, '192, and '959 Patents

By Professor Stuart C. Schwartz

My name is Stuart C. Schwartz. I am a professor of Electrical Engineering at Princeton University. I provide this report on behalf of plaintiffs TruePosition and KSI in response to Allen's expert reports regarding United States Patents Nos. 6,119,013 ("the '013 Patent"), 6,108,555 ("the '555 Patent"), 6,047,192 ("the '192 Patent") and 4,728,959 ("the '959 Patent"). A discussion of my educational background and employment history has been given in a previous expert report, dated July 15, 2003, on infringement. (See paragraphs 1-9 and attachment No.1 of that report.) That report is incorporated herein in its entirety as attachment 1.

I. Assignment

1. I have been asked to opine on issues of validity of Claim 1 of the '013 Patent, Claims 1, 2, 19, 20, 22, 24 and 45 of the '555 Patent, Claims 14-16 and 18-20 of the '192

Exhibit C

08/059,248

#2 Rec'd W/Ref 9-1-93 MDK

DOCKET NO.: ACOM-0001 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Louis A. Stilp; Curtis A.Knight; John C. Webber

Serial No.: **Not Yet Assigned** Group No.:

Filed: **Herewith** Examiner:

For: **CELLULAR TELEPHONE LOCATION SYSTEM**

I, Michael D. Stein, Registration No. 34,724 certify that this correspondence is being deposited with the U.S. Postal Service as First Class mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

On 5-7-93

Michael D. Stein

Michael D. Stein Reg. No. 34,724

Commissioner of Patents & Trademarks
Washington, DC 20231

Sir:

INFORMATION DISCLOSURE STATEMENT
SUPPORTING PETITION TO MAKE SPECIAL

The following detailed discussion of the references listed on the attached Form PTO-1449 particularly points out how the claimed subject matter is distinguished over the references. One copy of each of the references listed on the Form PTO-1449 is submitted herewith.

The article entitled "Passive Location of Mobile Cellular Telephone Terminals" discusses the need for a method of locating a moving or stationary mobile cellular telephone. In particular, this paper discloses the basic concepts of determining range information from the phase of SAT signals or the RF signal amplitude, and determining angles of arrival by an interferometric approach. This paper fails to disclose sufficient detail to enable one to produce a working system. Moreover, this paper lacks disclosure of the concept of monitoring control channels to obtain data from which the locations of mobile

cellular telephones are determined. Furthermore, this paper lacks disclosure of the claimed apparatus and methods for obtaining location information from the weak, short duration control channel signals. For example, this article neither discloses nor suggests a cellular telephone location system comprising (see applicants' claim 1):

> (a) at least three cell site systems, each cell site system comprising: an elevated ground-based antenna; a baseband convertor operatively coupled to said antenna for receiving cellular telephone signals transmitted over a control channel by said cellular telephones and providing baseband signals derived from the cellular telephone signals; a timing signal receiver for receiving a timing signal common to all cell sites; and a sampling subsystem operatively coupled to said timing signal receiver and said baseband convertor for sampling said baseband signal at a prescribed sampling frequency and formatting the sampled signal into frames of digital data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said cellular telephone signals were received; and
>
> (b) a central site system operatively coupled to said cell site systems, comprising: means for processing said frames of data from said cell site systems to generate a table identifying individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell site systems; and means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.

U.S. Patent No. 5,008,679 (Effland et al.) discloses a satellite-based system for locating an interfering transmitter. This patent lacks any disclosure related to cellular telephones; moreover, it fails to teach or suggest the desirability of locating a cellular telephone.

U.S. Patent No. 4,740,792 (Sagey) discloses a satellite-based vehicle location system including vehicle-mounted radio frequency transmitters and elevated (satellite-based) relay stations that receive transmitted signals from the vehicle-mounted transmitters and relay such signals to a central processing station. The central processing station separates the

relayed signals from one another and encodes the time of arrival at the processing station onto the received signals and then determines from time differences of arrival the location of the associated transmitters. The means for separating the relayed signals from one another include means for correlating the synchronization data encoded into the synchronization symbol of each signal with a corresponding stored code to enable the system to identify the beginning of individual signals. Applicants respectfully note that his patent fails to teach or suggest a ground-based system locating cellular telephones as described in applicants' claims. In particular, there is no teaching or suggestion of monitoring control channel transmissions or of the claimed apparatus and methods to achieve such monitoring. It should be noted that Sagey discloses correlating the synchronization data encoded into each signal with a corresponding stored code. Applicants respectfully submit that this disclosure of correlating a synchronization code with a stored code does not teach or suggest applicants' claimed system which, in preferred embodiments (see claim 3), cross-correlates a frame of data corresponding to one cell site with corresponding (in terms of time) frames of data from each other cell site.

U.S. Patent No. 5,023,900 (Tayloe) discloses a system for diagnosing a cellular radio telephone system. This patent does not disclose or suggest a system for locating cellular telephones. U.S. Patent No. 5,095,500 is a continuation of U.S. Patent No. 5,023,900.

U.S. Patent No. 5,166,694 (Russell et al.) discloses a vehicle location system that processes time of arrival signals to produce a geometric dilution of precision (GDOP) table at periodic intervals. Time of arrival signals are then prefiltered to determined an

optimum subset of data for further processing. This patent neither teaches nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited in applicants' claims.

U.S. Patent No. 5,003,317 (Gray et al.) discloses a stolen vehicle recovery system employing direction-finding (DF) to measure the bearing from each receiver to a stolen vehicle. This patent fails to teach or suggest a cellular telephone location system employing control channel signals to determine the locations of mobile cellular telephones.

U.S. Patent No. 4,870,422 (Counselman, III) discloses a system for determining a baseline vector between a pair of survey marks on the ground by radio interferometry using radio signals broadcasts from satellites. This patent fails to teach or suggest a cellular telephone location system.

U.S. Patent No. 4,791,572 (Green, III et al.) discloses a method for displaying positional information on a map. This patent does not teach or suggest a system for locating a cellular telephone.

U.S. Patent No. 4,177,466 (Reagan) discloses an auto theft detection system that employs a measurement of signal strength or, alternatively, a radio direction finder signal. This patent neither teaches nor suggests a system for locating cellular telephones.

U.S. Patent No. 4,651,157 (Gray et al.) discloses a system for locating a vehicle. The system employs an on-board security system that includes a LORAN-C receiver and a two-way full duplex transmitting radio in communication with a central station. This patent neither teaches nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited

in applicants' claims.

U.S. Patent No. 4,742,357 (Rackley) discloses a radio location system employing a network of receivers, a base station, and an object unit associated with the object to be located. The object unit receives locate request messages and echo pulses transmitted by the base station. In addition, the object unit has a variable frequency transmitter for transmitting messages and relaying the received echo pulses. This patent neither discloses nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited in applicants' claims.

U.S. Patent No. 4,926,161 (Cupp) discloses a method for avoiding slow play on a golf course. The disclosed method includes monitoring the location of golf course carts as they travel through a golf course. This patent lacks disclosure of a system for locating cellular telephones.

U.S. Patent Nos. 4,818,998 and 4,908,629 (Apsell et al.) disclose a vehicle location system which employs transponder- or transceiver-equipped stolen vehicles and appropriately-equipped police direction-finding tracking vehicles. The tracking vehicles "home in" on periodical transponder reply radio transmissions activated by command activation signals. These patents neither disclose nor suggest a system for locating cellular telephones by monitoring control channels.

U.S. Patent No. 4,728,959 (Maloney) discloses a system for locating a mobile radio transmitter located in a service area of a cellular telephone system. In particular, the disclosed system employs phase angle measurements indicative of the angle of direction of a

mobile transmitter from each of a plurality of land stations and processes theses phase angle measurements to locate the mobile transmitter. The phase angle measurements are obtained by translated Hilbert transformations and are processed to produce a probability density function. The probability density functions are combined after a Chi-squared analysis to produce an area of uncertainty representing the position of the mobile transmitter. Processing units at the land stations determine complex phaser relationships between the antenna elements that represent the conjugate product of the signals in the two antenna elements corresponding to the phase of the radio signals in each antenna element and the direction angle to the mobile transmitter from the land station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,651,156 (Martinez) discloses a radio location system comprising a single broadcast station and two fixed receivers. According to the disclosed system, hand-held or vehicle-borne radio locator-transmitter devices transmit their positions and identities to the centrally located fixed receivers. Each of the locator transmitter devices is continuously phase-locked to the RF carrier broadcast by a nearby broadcast station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,891,650 (Sheffer) discloses a system for locating a selected vehicle from which an alarm signal is generated. The disclosed system includes a fixed array of cellular sites each having signal detecting and generating units capable of receiving an input alarm signal having a signal strength which is a function of the distance between the

vehicle generating the alarm signal and the signal-detecting unit. The alarm signal includes a pulse signal which identifies the subscriber or the vehicle. U.S. Patent No. 5,055,851 is a continuation of U.S. Patent No. 4,891,650. Neither of these patents disclose or suggest monitoring control channel transmissions.

U.S. Patent No. 4,596,988 (Wanka) discloses a tracking system that, when interrogated, reports the location of a missing article. The disclosed system employs a concealed radio receiver 12 coupled to a trackable transmitter 14, and a network of remote receiving stations 18. The remote receiving stations each contain an automatic direction finder (ADF). The receiving stations 18 each receive a signal from the hidden transmitter and determine the bearing relative to the location of the individual receiving station, and transmit this bearing information via a modem to a base station 22. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,433,335 (Wind) discloses a system for determining the location of a transmitter. The disclosed system comprises at least two spaced receivers for receiving electromagnetic signals from the transmitter to be located and means for Fourier transforming the received signals and representing the transformed signals as complex functions of frequency. A complex division of pairs of the signals is performed to obtain signals represented by the phase differences between pairs of signals as functions of frequency. The difference in phase between pairs of signals as a function of frequency is employed to determine the time differences existing between the same pairs of functions. From these time differences, the position of the transmitter is determined. This patent lacks

any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 5,023,809 (Spackman et al.) discloses a system that tracks the position of a vehicle in which an oscillator/transmitter pair is positioned. At least three translators receive the signals transmitted from the target and each retransmits the signal to a base receiving station. The base receiving station also receives the signal sent from the target and compares each of the signals received from the translator with the signal sent directly from the target. The output of the comparator purportedly provides an indication of the position of the target relative to the base receiving station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 3,384,891 (Anderson) discloses a radio navigation system employing satellites or aircraft.

U.S. Patent No. 4,975,710 (Baghdady) discloses a system for performing direction of arrival (DOA) measurements. The disclosed system employs long-baseline, phase-difference, paired-antenna interferometry and DOA-computing array processing algorithms.

U.S. Patent No. 4,888,593 (Friedman et al.) discloses a system employing cyclic cross-correlation to perform direction-finding on a radio signal modulated by a digital signal and existing in a heavy interference environment.

U.S. Patent No. 4,297,701 (Henriques) discloses a range finding system for use on a golf course.

U.S. Patent No. 4,797,679 (Cusdin et al.) discloses a system for determining the direction of incidence of signals from a distant source. In particular, the patent is directed to providing an improved short-baseline time difference of arrival direction-finding system.

U.S. Patent No. 4,639,733 (King) discloses an interferometer-type direction finding system employing an array of five antennas arranged, respectively, at the apices of a regular pentagon.

U.S. Patent No. 4,638,321 (Drogin) discloses a wide baseline interferometer employing a pair of receivers 42, 44 and a common local oscillator 46.

These patents lack any disclosure or suggestion of a system or method for locating mobile cellular telephones by monitoring control channel signals and processing such signals to obtain location information. As discussed in applicants' specification, there are numerous advantages provided by monitoring control channels to track the locations of cellular telephones. First, a voice channel is an expensive and relatively scarce resource. Cellular systems typically require approximately six to eight seconds to allocate a voice channel to a specific telephone. If voice channels were employed for location tracking, the cellular telephone would have to be called and commanded to initiate a voice channel call every time a location sample were to be taken. This would be both expensive and time consuming. Thus, it would be extremely inefficient for a location system to require the telephone to initiate periodic voice channel transmissions. Second, each voice channel transmission adds a call record in an associated billing system. Therefore, a large burden would be placed on the billing system if the location system were to require periodic voice

channel transmissions. In contrast, control channel transmissions already occur periodically in cellular systems. Thus, the present invention is compatible with existing cellular telephone protocols and would not require the cellular system or the individual cellular telephones to be modified. Third, since the frequency of control channel transmissions is software controllable, a location system in accordance with the present invention could control the frequency of control channel transmissions and offer different subscribers different location information update rates. Fourth, another advantage afforded by monitoring control channel transmissions is in connection with energy efficiency. Control channel transmissions are very short and require little power in comparison to voice channel transmissions. Accordingly, requiring periodic voice channel transmissions would cause a significant battery drain in the individual cellular telephones. This is avoided by monitoring control channels.

For all of the foregoing reasons, applicants' respectfully submit that the claimed subject matter is patentable over the prior art.

Respectfully submitted,

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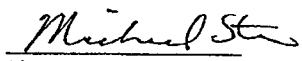

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